

REMARKS

Please reconsider the present application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering the present application.

I. Disposition of Claims

Claims 1-19 are currently pending in the present application. By way of this reply, claims 7 and 9 have been amended.

II. Claim Amendments

Claims 7 and 9 have been amended to correct minor punctuation informalities. No new matter has been added by way of these amendments.

III. Rejection(s) under 35 U.S.C § 103

Claims 1, 2, 4, 5, 11, 12-15, and 16

Claims 1, 2, 4, 5, 11, 12-15, and 16 of the present application were rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese reference 11-10146 (hereinafter “JP 146”) in view of U.S. Patent No. 4,909,943 issued to Fibiger et al. (hereinafter “Fibiger”). For the reasons set forth below, this rejection is respectfully traversed.

The present application is directed toward a water treatment apparatus. The water treatment apparatus, with reference to the exemplary embodiment of the present invention shown in Figure 1 of the present application, requires (as recited in independent claim 1 of the present application) a plurality of composite reverse osmosis membrane

modules 5 and 11 arranged in multi-stages, where each of the plurality of modules 5 and 11 includes a porous support and a polyamide skin layer formed on the porous support, where the plurality of modules 5 and 11 include a final-stage module 11 and at least one pre-final module 5, where a selected portion 7 and 10 of permeated water obtained from the at least one pre-final module 5 is supplied to the final-stage module 11, and where the rest 6 of the permeated water is discharged from or recovered in the water treatment apparatus along with the permeated water 12 obtained from the final-stage module 11. Further, independent claim 1 of the present application requires that a polyamide skin layer of the at least one pre-final module 5 comprise bromine atoms.

As expressly stated in the Office Action of July 15, 2003, JP 146 fails to disclose a pre-final module having a polyamide skin layer that comprises bromine atoms as required by independent claim 1 of the present application. Fibiger also fails to disclose this limitation of independent claim 1 of the present application.

Fibiger discloses a polyamide discriminating layer that can be prepared by a reaction of an aromatic polyamide compound and an acyl halide. *See* Fibiger, column 4, line 63 – column 5, line 4. Fibiger further discloses that the acyl halide may refer to acyl bromide groups. *See* Fibiger, column 5, lines 4 – 6.

However, markedly, a polyamide discriminating layer prepared in the manner disclosed in Fibiger *does not* contain a halogen. In the absence of halogen, when an acyl bromide reacts with a polyamine compound, polyamide and HBr (bromic acid) are generated. Significantly, the HBr does not react with the polyamide and is washed away by the treatment with water. Therefore, by using the method of forming a polyamide layer disclosed in Fibiger, the formation of a polyamide layer having bromine atoms

cannot be achieved. Even in the case where a -COBr group in the acyl bromide is left without reacting with an amino group, the -COBr group in the acyl bromide is hydrolyzed with water or water vapor in the air immediately, thereby generating a -COOH carboxyl group and HBr. As described previously, the HBr is washed away and not present as part of the polyamide layer.

On the other hand, in the present invention, a polyamide layer is formed such that the polyamide layer comprises bromine atoms. In Example 1 of the present application, a polyamide layer is formed by the reaction of an acyl chloride and an aromatic polyamine compound. However, similar to as discussed above, because a polyamide layer having bromine atoms cannot be obtained by merely causing the reaction of an acyl bromide with a polyamine compound, a polyamide layer comprising chlorine atoms cannot be obtained by simply reacting acyl chloride and a polyamine compound.

Thus, in the present invention, as disclosed in Example 1 of the present application, after causing the reaction of the acyl chloride and the aromatic polyamine compound, treatment using a solution containing Cl₂ and NaBr is further carried out. *See* Specification, page 14, lines 30 – 32. Such treatment results in a polyamide layer comprising bromine atoms as is described below.

In Example 1 of the present application, when Cl₂ and NaBr are dissolved in water, HClO (resulting from the reaction of Cl₂ and water) reacts with Br⁻ to generate HBrO, which, in turn, brominates or oxidizes the polyamide layer, thereby causing the polyamide layer to contain bromine atoms. Thus, although the scope of the present invention is not limited to the method described in Example 1 of the present application, the present application shows how a polyamide layer comprising bromine atoms is

obtained. Fibiger, on the other hand, fails to disclose the formation of a polyamide layer having bromine atoms. In Fibiger, the presence of Br in a reaction to generate the polyamide layer does not result in a polyamide layer comprising bromine atoms as required by independent claim 1 of the present application.

In view of the above, JP 146 and Fibiger, whether considered separately or in combination, fail to show or suggest the present invention as recited in independent claim 1 of the present application. Thus, independent claim 1 of the present application is patentable over JP 146 and Fibiger. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 3, 6-10, and 17-19

Claims 3, 6-10, and 17-19 of the present application were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 146 in view of Fibiger and further in view of U.S. Patent No. 4,046,685 issued to Bray (hereinafter “Bray”). For the reasons set forth below, this rejection is respectfully traversed.

Like JP 146 and Fibiger discussed above, Bray fails to disclose all the limitations of independent claim 1 of the present application. Bray, which discloses a reverse osmosis apparatus having an elongated container housing a plurality of semi-permeable cartridges (*see* Bray, Abstract), is altogether silent as to a polyamide layer, and thus, necessarily cannot disclose a polyamide layer comprising bromine atoms as required by independent claim 1 of the present application. Thus, Bray fails to disclose those limitations of independent claim 1 of the present application not disclosed or taught in JP 146 and Fibiger.

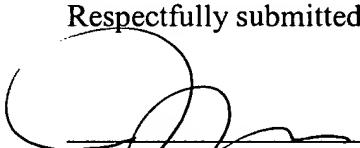
In view of the above, JP 146, Fibiger, and Bray, whether considered separately or in any combination, fail to show or suggest the present invention as recited in independent claim 1 of the present application. Thus, independent claim 1 of the present application is patentable over JP 146, Fibiger, and Bray. Dependent claims 3, 6-10, and 17-19 are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

IV. Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 04558.048001).

Respectfully submitted,

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